North Carolina Department of Transportation

# Chapter 15 Floodplain Management

January 2022

| Revisions Sheet | | | |
|---|---|---|---|
| **Page** | **Old Section** | **New Section** | **Description** |
| - | - | - | • Entire Chapter has been revised for content<br>• All references and links have been updated throughout Chapter |

# Table of Contents: Chapter 15, Floodplain Management

# 15.1 Introduction

No road or structure including its members, shall be constructed, improved, or removed within a designated regulatory floodway or non-encroachment area without a regulatory review and approval. Federal Emergency Management Agency (FEMA) designates these areas as a regulated Special Flood Hazard Area (SFHA), as shown on the effective Flood Insurance Rate Maps (FIRMs) and/or the Flood Risk Information System (FRIS) website (http://fris.nc.gov/fris/).

A longitudinal encroachment, such as a roadway that is constructed parallel to a stream, encroaching into the stream's floodplain, does not require a regulatory review or approval if the encroachment is not within the designated regulated floodway or non-encroachment area. This does not relieve the engineer from risk or potential liability associated with adverse effects to adjoining properties because of such action. As such, the Design Engineer should evaluate the risk and consider performing a hydraulic study and flood damage assessment to the adjoining properties that are in the floodplain.

## 15.1.1. Coordination with Regulatory Agencies

Any such work as noted in Section 15.1 requires coordination and approval from FEMA, or its designees in North Carolina, which are the North Carolina Division of Emergency Management Floodplain Mapping Program (NCFMP) and Charlotte-Mecklenburg Storm Water Services (CMSWS). NCFMP is authorized to issue Flood Insurance Rate Maps statewide. The NCDOT Highway Floodplain Program (HFP) has been established as a delegated authority through a Memorandum of Agreement (MOA) with NCFMP to facilitate coordination and approvals for project impacts within SFHAs.

Federal Aid projects must comply with FHWA regulations or orders, while being consistent with FEMA requirements (including Executive Orders). FHWA regulation applies to all Federal Aid actions in a base floodplain, not just FEMA-regulated floodplains.

## 15.1.2. Guiding Regulations, Rules and Policies

Most streams have designated SFHAs. There are three types of flood studies performed and promulgated in North Carolina: Detailed Study (DS), Redelineated Detailed Study (RDS) and Limited Detailed Study (LDS). It is the policy of NCDOT to follow Federal and State floodplain management regulations and rules. These include:

- FEMA's National Flood Insurance Program (NFIP) (FEMA, 2016)
- FHWA's *Federal Aid Policy Guide, Location and Hydraulic Design of Encroachments on Flood Plains* (23 CFR 650 Subpart A) (FHWA, 1969)
- Memorandum of Understanding by FHWA and FEMA (June 1982) (FHWA, J. Krolak, 2011),
- Presidential Executive Order 11988 (Federal Register, 1977)

- Presidential Executive Order 13690 (Federal Register, 2015),
- North Carolina Governor's Executive Order 123 (July 1990) (Martin, 1990)

NCDOT's policy encourages encourage a broad and unified effort to:

- employ a practical and reasonable approach to the design of transportation facilities located within floodplains
- avoid encroachments into floodplains to the extent practicable
- minimize and mitigate unavoidable adverse impacts on adjoining properties in floodplains
- restore and preserve natural floodplain value and function to the extent practicable

## 15.2 Project Coordination

During project planning and development, the Hydraulic Design Engineer shall evaluate impacts to SFHAs and determine appropriate mitigation strategies. Such mitigation strategies and evaluations may require coordination with NCDOT HFP, FEMA, NCFMP, or CMSWS.

### 15.2.1. Planning Stage Coordination

For projects requiring anEnvironmental Impact Statement (EIS), determine if the selection of the Least Environmentally Damaging Practical Alternative (LEDPA) would require impacts to floodplains. If necessary, obtain a written statement regarding such determination from FEMA, NCFMP, or CMSWS prior to the completion of the final EIS or Finding of No Significant Impact (FONSI). An example of this is a proposed roadway alignment that results in a longitudinal encroachment of a FEMA regulated floodway that causes potential flood damage to insurable structures.

For projects that are processed with a Categorical Exclusion and would potentially impact a FEMA regulated floodway, confirm with NCDOT HFP to determine if additional coordination is warranted. In most cases, additional coordination is only necessary during the design stage.

Endangered Species Act (ESA) compliance is required for projects that require a Conditional Letter of Map Revision (CLOMR). Refer to the guidance for CLOMRs at FEMA's website.

### 15.2.2. Final Design Stage Coordination

State Floodplain Compliance (SFC) approval in final design stage is achieved by following the currently applicable technical guidance posted on the Hydraulics Unit website (CCP).

Conditional Letter of Map Revision (CLOMR) approval in final design stage is achieved for projects which cause base flood elevation increases above those permitted under

subparagraphs (c)(10) or (d)(3) of the US Code of Federal Regulations 44 CFR 60.3 (FEMA, 2016). Any which result in an increase in the 100-year Base Flood Elevation (BFE) will require a floodway revision and corresponding approval of a CLOMR.

### 15.2.3. Post-Construction Coordination

As-built Plans Review and Final Submittal is required within six months of a structure's completion on a FEMA-regulated stream. Follow the currently applicable technical guidance posted on the Hydraulics Unit website (CCP).

## 15.3 Maintenance Activities in FEMA Regulatory Area

The Department evaluates the impacts to SFHAs for maintenance activities to determine appropriate mitigation strategies. These mitigation strategies and evaluations may require coordination with NCDOT HFP and be in accordance with the currently applicable technical guidance posted on the Hydraulics Unit website (CCP).

Maintenance activities include:

- resurfacing
- roadway cross-section modification(s)
- shoulder widening
- addition of guardrail, sidewalk or curb and gutter systems
- culvert modification(s) of any kind

### 15.3.1. Maintenance Culvert Replacements on a FEMA Regulatory Stream

A review process was established between NCFMP and NCDOT to help streamline review of the Department's maintenance culvert replacements. The agreement is based on NCDOT maintenance culvert replacements only and was established with consideration given to the minimal nature of the work. The process applies only for NCDOT County/Bridge Maintenance culvert-to-culvert replacements (excluding RCBCs) with no adjustments to road grades. RCBC, Bridge replacements and road grade changes do not qualify for this review process and require review through the SFC process. Follow the currently applicable technical guidance posted on the Hydraulics Unit website (CCP).

## 15.4 Acceptable Level of Precision

For floodplain compliance reports, all reported water surface elevations, including the Base Flood Elevation (BFE), should be specified to the nearest one hundredth of a foot (0.01 foot).

The reported BFE proposed conditions and existing conditions elevations are compared to determine the applicability for SFC approval. This applies to all streams in the State, regardless of types of the flood study (DS, RDS or LDS).

All proposed floodway and non-encroachment width dimensions should be specified to the nearest foot.

## 15.5 Avoidance of FEMA Buyout Properties

Any construction or alteration of the transportation facilities (roadway embankment, sidewalk, stormwater BMPs, roadside ditches, etc.) on the FEMA buyout properties shall be avoided to the extent practicable. A FEMA buyout property is defined as any land that was purchased by a local government and reimbursed by FEMA under its Hazard Mitigation Grant Program (HMGP) or Flood Mitigation Assistance Program (FMA) for the restoration and preservation of the floodplain (FEMA, 2015). If encroachment by the proposed transportation facility cannot be avoided, the Design Engineer shall coordinate with FEMA, through NCFMP, for consultation, coordination, and approval prior to the project letting. For additional information, see Chapter 2, Section 2.2.5.3.

## 15.6 Temporary Encroachment in Regulatory Floodway

Temporary roads for construction activities and on-site detour traffic that last longer than one year and encroach into the floodway must be reviewed and coordinated with NCDOT HFP. The Design Engineer should assess risk for such activities, perform hydraulic analysis and work with Division staff to include a provision in the project's contract to stipulate the following, as applicable:

- duration of construction within the floodway
- installation of on-site stream gages
- installation of a flood warning system
- designated staging areas for equipment that are at least one foot above the BFE
- notification of the affected property owners of the potential risk of flooding from the temporary encroachment
- department commitment assuming liability for any flood damages resulting from the temporary encroachment

No SFC, CLOMR or LOMR approvals will be required for the temporary encroachment into the FEMA regulated floodway.

## 15.7 Emergency Replacement of Drainage Structures

Emergency replacements requiring federal reimbursement should follow the protocol below:

- recommendations should follow Guidance set by the CCP and NCDOT *Guidelines for Drainage Studies and Hydraulic Design*
- when a structure is located on a FEMA regulatory stream, NCDOT coordinates with FMP as defined in section 15.3.1
- culvert (excluding RCBC): NCDOT submits a Hydrologic and Hydraulic (H&H) Report to State Maintenance Office for Federal reimbursement. See Section 15.7.1 for more information about H&H reports.
- Reinforced Concrete Box Culvert and Bridge: NCDOT submits the appropriate Bridge or Culvert Design Documentation to State Maintenance Office for Federal reimbursement. (Chapters 8 and 9)

Design and estimates should be submitted to the Division for federal reimbursement documentation.

### 15.7.1. Hydrologic & Hydraulic (H&H) Reports Needed for Federal Reimbursement

A Hydrologic and Hydraulic (H&H) report is required to obtain Federal reimbursement for damages due to extreme weather events. The H&H report falls under FEMA's Public Assistance Program and Policy Guide (PAPPG) under that document's Appendix J: Cost-Effective Hazard Mitigation Measures. A report is required before a replacement can be made to ensure that the facility's LOS is maintained or improved, there are no adverse impacts to adjacent properties, and it follows the regulations of the NFIP. The H&H report consists of the following information (an example can be found on the Hydraulics Website):

- geographical information
- County
- road number and name
- latitude and longitude
- nearby crossing (road location)
- topographical map
- presence of any downstream structures
- hydrological information
- river basin
- drainage area
- hydrology for discharge determination

- FEMA study type
- hydraulic calculations using the charts from FHWA's Hydraulic Design of Highway Culverts – Series 5 (HDS-5) (FHWA, J.D.Schall, P.L. Thompson, S.M. Zerges, R.T. Kilgore, J.L. Morris (authors), 2012)
- existing and proposed inlet and outlet calculations
- existing and proposed inlet and outlet velocities
- existing and proposed inlet and outlet elevations
- package signed and sealed by a Professional Engineer (PE)
- package addressed to the Division Maintenance Engineer
- copy sent to the Division County or Bridge Maintenance Engineer

## 15.8 References

Federal Register. (1977, May). *Floodplain Management, Executive Order 11988*. Retrieved November 2021, from 42 FR 26971, 3 CFR, 1977 Comp. p. 117: https://www.archives.gov/federal-register/codification/executive-order/11988.html

Federal Register. (2015). *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*. Retrieved November 2021, from Executive Order 13690, Federal Register, 80 FR 6425: https://www.federalregister.gov/documents/2015/02/04/2015-02379/establishing-a-federal-flood-risk-management-standard-and-a-process-for-further-soliciting-and

FEMA. (2015). *Hazard Mitigation Assistance Guidance; Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program.* Washington DC: Federal Emergency Management Agency, U.S. Department of Homeland Security.

FEMA. (2016, June 22). *Emergency Management and Assistance, Subchapter B - Insurance and Hazard Mitigation; Title 44, Code of Federal Regulations*. Retrieved November 2021, from https://www.govinfo.gov/content/pkg/CFR-2013-title44-vol1/pdf/CFR-2013-title44-vol1.pdf

FHWA. (1969). *Federal Aid Policy Guide, Location and Hydraulic Design of Encroachments on Flood Plains, Title 23 Code of Federal Regulations (CFR) 650, Subpart A.* Washington DC: Federal Highway Administration, U.S. Department of Transportation.

FHWA, J. Krolak. (2011). *Additional Guidance on 23 CFR 650A.* Retrieved November 2021, from Federal Highway Administration, U.S. Department of Transportation: https://www.fhwa.dot.gov/engineering/hydraulics/policymemo/0650asu1.cfm

FHWA, J.D.Schall, P.L. Thompson, S.M. Zerges, R.T. Kilgore, J.L. Morris (authors). (2012, April). *Hydraulic Design of Highway Culverts, Third Edition, Hydraulic Design Series Number 5 (HDS-5).* Retrieved from Federal Highway Administation, U.S. Department of Transportation: https://www.fhwa.dot.gov/engineering/hydraulics/pubs/12026/hif12026.pdf

Martin, G. J. (1990). *North Carolina Executive Order 123 Uniform Floodplain Management Policy.* Raleigh, NC.

NCDOT. (2016). *NCDOT - NCFMP Memorandum of Agreement (Mod. 8/12/2016).* https://connect.ncdot.gov/resources/hydro/FEMA%20and%20Interagency%20Design/MOA_mod_20160812_(AID_6686).pdf: North Carolina Department of Transportation and North Carolina Floodplain Mapping Program.

## 15.9 Additional Documentation

NCDOT MOA Coordination & Compliance Plan (CCP)